Scand J Rehab Med 2000; 32: 80–86

A RANDOMIZED CONTROLLED TRIAL OF REHABILITATION AT HOME AFTER STROKE IN SOUTHWEST STOCKHOLM: OUTCOME AT SIX MONTHS

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A 6-month follow-up of a single-blind, randomized, controlled trial in Southwest Stockholm was performed in order to evaluate the effect of early supported discharge and continued rehabilitation at home after stroke. Eighty-three stroke patients with moderate neurological impairments, continent, independent in feeding, and mental function within normal limits one week after onset were included in the study. The patients were allocated 1:1 to early supported discharge and continued rehabilitation at home by a specialized team, versus routine rehabilitation. Patient outcomes measured were motor capacity, dysphasia, activities of daily living, social activities, perceived dysfunction, mortality and reported falls. Data on length of stay in hospital; initial and recurrent during 6 months were compared. The 6-month follow-up of 78 patients showed no statistically significant differences in patient outcome. The results of multivariate logistic regression analysis suggest a positive effect of home rehabilitation on activities of daily living. At 3–6 months the frequency of significant improvements was higher in the intervention group. Death or dependency in activities of daily living was 24% in the intervention group compared with 44% in the control group. The mean initial hospitalization was 29 days in routine rehabilitation group versus 14 days in the home rehabilitation group. We conclude that for moderately disabled stroke patients with mental function within normal limits, early supported discharge and continued rehabilitation at home had no less a beneficial effect on patient outcome than routine rehabilitation, reduced initial hospitalization significantly and had no adverse effects on mortality and number of falls.

Key words: activities of daily living, cerebrovascular disorders, disability, home, randomized controlled trial, rehabilitation, stroke.

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(Accepted for publication September 17, 1999)

Stroke is a major healthcare problem and consumes a considerable amount of resources. Compared to general hospital care, stroke units contribute to a significant reduction in mortality, long-term care and the level of dependency in personal activities of daily living (ADL) after stroke (1). Consideration given to the impact on patient outcome of the acute care received after stroke is particularly important when comparing interventions during the subacute stage post-stroke, since differences in dependency and mortality that occur during the acute stage have been reported to remain at 5 years after stroke onset (2). Stroke outcomes are commonly expressed either as a reduction in mortality or long-term care, or as a lowered level of impairment or disability (3). Health-related quality of life or level of handicap (3) post-stroke in relation to health services delivered is less frequently assessed. The optimal organization of stroke rehabilitation services in order to achieve the goal of maximizing the patient's role fulfilment in his/her environment (4) is not known.

In 1996 the Pan European Consensus Meeting on Stroke Management (5) strongly recommended access to acute stroke care in specialized units or by teams. In Sweden, 95% of stroke patients are admitted to hospital in the acute stage (6) and 63% receive care and rehabilitation in a stroke unit (personal communication, B Stegmayr (1998)). Interest in organizing and delivering rehabilitation services in the patient's home is rapidly growing and, at present, there are approximately 50 teams (7) in Sweden supplying such services, 7 of which are dedicated to stroke. Home rehabilitation for stroke patients after discharge from hospital has been the subject of four randomized controlled trials in Great Britain, namely, the Bradford (8, 9), DOMINO (10, 11) London (12), and Newcastle-upon-Tyne (13) studies; plus the present study in Southwest Stockholm, Sweden (14). To our knowledge, our study is the only trial in which acute care in a stroke unit has been combined either with early supported discharge and continued rehabilitation in patients' homes, or with routine rehabilitation. Growing interest in home rehabilitation has in turn led to a desire to combine results in meta-analysis, preferably reporting outcome both in the early stages of rehabilitation (when most recovery is expected) and at the end of the intervention. Follow-up at 6 months might be advantageous to minimize the effect of earlier unstable evalua-

 ISSN 0036–5505

tions and considerable losses in protracted follow-up of established deficits. Whereas the Swedish study's 3-month follow-up (14) did not reveal any overall statistical differences in patient outcome, a multivariate logistic regression analysis indicated a systematic positive effect of home rehabilitation on social activities, ADL, motor capacity, manual dexterity and walking. A considerable reduction in initial hospitalization was seen among the home rehabilitation group (HRG) versus the routine rehabilitation group (RRG).

The aim of the present study was to evaluate the effect of early supported discharge and continued rehabilitation at home on patient outcome and hospitalization, and the use of home rehabilitation services for the HRG at 6 months after onset of stroke, a point in time when all rehabilitation at home had been accomplished in the above-mentioned trial. To determine whether benefits achieved at three months were maintained or altered, we analysed changes in patient outcome at 3 to 6 months.

METHODS

A detailed description of the aims of the trial, patient selection criteria, recruitment and randomization procedure is presented elsewhere (14, 15). In short, all patients from the catchment area were admitted to Huddinge University Hospital. Patients diagnosed with first or recurrent stroke were screened for inclusion in a randomized controlled trial of early supported discharge and continued rehabilitation at home. All patients received initial medical care and attention in the stroke unit at the Department of Neurology, Huddinge University Hospital. One week after onset, the eligible patients had impaired motor capacity according to the Lindmark Motor Capacity Assessment (LMCA) (16, 17), and/or dysphasia according to the Reinvang Aphasia Test (RAT) (18), but were continent and independent in feeding according to the Katz ADL Index (19) and had a Mini Mental State Exam (20) score >23. Patients were randomized 1:1 to the HRG or the RRG. All patients were assessed by a senior neurologist on day 5–7 after onset, using the Scandinavian Stroke Scale (21). The early discharge procedure and the organizing of the home rehabilitation programme have been described in a previous paper (14). Early discharge for the HRG sought to coincide with the patient's attaining independence in toileting according to the Katz ADL Index. The rehabilitation programme (14, 15, 22, 23), which was tailor-made for each patient, continued in their homes for 3 to 4 months. Where additional rehabilitation was required, the patient was to be referred to routine outpatient rehabilitation. RRG patients received their rehabilitation in the stroke unit until discharge and, if required (and after evaluation by specialists), in the Geriatrics or Rehabilitation Departments as inpatients and/or in day care.

Information on length of hospital stay—initial and recurrent—and mortality was collected from the Stockholm County Council's computerized register. The number of home visits by therapists in the HRG was drawn from therapists' records.

Six months after stroke, patients were assessed and interviewed at home by an external assessor, a research physiotherapist. A range of standardized outcome assessments was used in order to reflect differences and changes in level of impairment, disability and handicap. The evaluation included motor capacity by LMCA (16, 17) time to walk 10 m (24), manual dexterity with the Nine-Hole Peg Test (25), the Barthel ADL Index (26, 27), Katz ADL Index (19), and Extended Katz ADL Index (28). Frequency of social activities was assessed with the Frenchay Activities Index (FAI) (29), perceived dysfunction with the Sickness Impact Profile (SIP) (30, 31), and coping capacity with Sense of Coherence (SOC) (32, 33). The patient's self-reported number of falls was used to assess the frequency of falls. Patients with dysphasia were evaluated by an external research speech therapist on the basis of the RAT (18). Both assessors were blind to group assignment and were involved with neither the randomization procedure nor the organizing and carrying out of rehabilitation. No assessment of blinding was carried out. The above-described method was also employed on completion of the 3-month follow-up, and the data so derived were then used to assess changes between 3 and 6 months.

The combined adverse outcome of death or dependency was calculated. Patients lost to follow-up were not included in the analysis. Dependency was categorized as having less than a full score on the Barthel ADL Index.

The study was approved by the Ethics Committee of Huddinge University Hospital.

Statistical analysis

In the crude analysis, differences in outcome for the HRG versus the RRG were calculated, as were intra-group changes over time. The statistical significance of differences between the groups was assessed using the Mann-Whitney U-test and χ^2 test, and changes within the groups over time, using the Wilcoxon signed-ranks test. A p-value of 0.05 or less was considered to be of statistical significance.

A logistic regression model was used to assess home rehabilitation while adjusting for confounders and imbalances in the baseline characteristics of the patients. The outcome variables were dichotomized with the median score or less categorized as poor. Less than full scores were categorized as dependent in the Extended Katz ADL and Barthel ADL indexes. The variables for outcomes and confounders, and the measurements and categorization procedures were used at 3-month follow-up and have been described elsewhere (14). The results of multivariate logistic regression analysis at 3 months were used for purposes of comparison. Statistical analysis was performed with the EPI Info 6 and SPSS 6.0 for Windows computer software programs.

RESULTS

A total of 83 patients was recruited to the trial, 42 in the HRG and 41 in the RRG. At 6 months after onset of stroke, 78 patients, 40 in the HRG and 38 in the RRG, were evaluated. Four patients died, one in the HRG and three in the RRG. One patient in the HRG withdrew for personal reasons one day after discharge and was lost to follow-up. The baseline characteristics of the 78 patients followed-up at 6 months are presented in Table I. The median Prognostic score 5–7 days after onset was 20 in both groups, as estimated with the Scandinavian Stroke Scale,

Table I. *Baseline characteristics of patients followed-up at 6 months*

Variable (range)	HRG, $n = 40$ (%)	RRG, $n = 38$ (%)
Scandinavian Stroke Scale		
Prognostic score (0–22)	20, 14–22*	20, 12–22*
Long–term score (0–48)	38.5, 12–46*	40, 23–46*
Maximal score (0–58)	48.5, 22–56*	50, 33–56*
Age, years	72, 49–84*	73, 49–89*
Men/women	22/18	21/17
Living with spouse	29 (72.5)	25 (65.8)
Independent in Katz ADL before stroke	39 (97.5)	37 (97.4)
Associated diseases before stroke	35 (88)	25 (66)
CT scan abnormal on admission	31 (78)	20 (53)
Localization of lesion right/left	15/23	22/13
Presence of aphasia	11	5
Coping, Sense of Coherence (13–91)	72, 50–91*	81, 51–91*

* Median, range.
HRG = home rehabilitation group; RRG = routine rehabilitation group.

Table II. *Outcome of patients in the home rehabilitation group (HRG) and routine rehabilitation group (RRG) at 6 months after stroke*

Variable (range)	HRG, *n* = 40 (%)	RRG, *n* = 38 (%)	*p*-value
Presence of aphasia	11 (27.5)	5 (13.2)	0.1979
Reinvang aphasia quotient (0–100)	70, 37–88*	85, 78–98*	0.4252
Literal paraphasia (0–100)	32, 13–32*	73, 52.5–73*	0.0277
Lindmark Motor Capacity Assessment, total score (0–153)	148.5, 145.5–151.5*	147, 140–151*	0.1297
Manual dexterity, pegs/s†	0.37, 0.29–0.45*	0.33, 0.2–0.39*	0.0904
Time to walk 10 m, s	10, 8.5–13*	11, 10–17*	0.0932
Barthel ADL, independent	31 (78)	23 (61)	0.1434
Barthel mobility, independent	39 (97.5)	30 (79)	0.0131
Katz personal ADL, independent	36 (90)	31 (81.6)	0.2886
Katz extended ADL, independent	23 (55)	16 (42.1)	0.2574
Frenchay Activities Index (0–45)	24, 20–28.5*	21.5, 16–27*	0.2535
Washing up (0–3)	3, 3–3*	3, 1–3*	0.0371

* Median, interquartile range.
† Able to perform test HRG *n* = 36, RRG *n* = 35.

with Long-term and Maximal scores being slightly higher in the RRG. At entry, HRG and RRG were well matched for age, gender, civil status, and level of independence in ADL, but there was an imbalance between the groups in (i) diagnosed associated diseases prior to stroke; (ii) side and size of lesion; (iii) presence of aphasia; and (iv) coping capacity. The RRG was healthier before stroke, with higher frequency of right hemisphere lesions, fewer and milder cases of dysphasia and better coping capacity.

The mean number of days of initial hospitalization was 14 in the HRG (range 5–33) and 29 in the RRG (range 5–136), a difference that was statistically significant ($p = 0.002$). The number of patients with recurrent hospitalization in the first six months after stroke was 10 in both groups, and the mean length of stay was 6 days for both the HRG and RRG.

At 3 to 6 months after onset, the last 20% of the total number of visits of the home rehabilitation programme had been carried out. In all, HRG patients received a mean of 12 visits (range 3–31) by a home rehabilitation team therapist.

Patient outcome

There was no statistically significant difference in reported number of falls during the first 6 months after stroke onset. Ten patients in the HRG and 7 in the RRG fell more than once; the falls caused soft-tissue injuries in 6 patients in the HRG and 8 in the RRG. While fractures caused by falls were reported in 3 patients in the RRG, there were no such fractures in the HRG.

Rehabilitation outcomes at 6-month follow-up are outlined in Table II. Total scores and subscores exhibiting statistically significant differences are listed. Dysphasia proved more severe in the HRG than in the RRG, with this being reflected in a lower overall score and in most subscores of the RAT. The difference in the RAT Literal paraphasia subscore was statistically significant ($p = 0.028$). Motor capacity, manual dexterity and gait velocity were better among HRG compared with RRG patients. Frequency of independence in ADL was higher in the HRG than in the RRG. Intergroup differences were statistically significant in Barthel Mobility ($p = 0.013$) but not in total scores. The level of social activities was higher in the HRG than in the RRG, and the HRG proved significantly more active in the FAI subscore Washing-up ($p = 0.037$).

Frequencies of maximal LMCA motor scores for the HRG and the RRG at 6 months are presented in detail in Table III. In the HRG, significantly more patients had reached the LMCA maximal Total motor score ($p = 0.030$). The frequency of maximal scores in all subscales of the LMCA was higher in the HRG versus the RRG, though non-significantly so.

Perceived dysfunction, SIP, in the HRG and RRG at 6 months is outlined in Table IV. Overall, perceived dysfunction was non-significantly higher in the HRG, indicating a larger impact than in the RRG, with both groups being most affected in the SIP Ambulation, Household management and Recreation and pastime subscales. Perceived dysfunction in SIP Communication was significantly higher for the HRG than for the RRG ($p = 0.016$).

Drawing on the crude and multivariate analyses at 3 and 6 months, comparative effects of home rehabilitation with respect to different patient outcome variables are presented in Table V. The systematic trend in evidence at 3 months after onset of a modest positive effect of home rehabilitation had become accentuated by the end of 6 months. The trend toward a negative effect on perceived dysfunction at 3 months seemed to be reduced at 6 months. The role of coping capacity in the effect of treatment had become emphasized: adjustment for SOC-based

Table III. *Frequency of maximal score of the Lindmark Motor Capacity Assessment of patients in the HRG and RRG at 6 months*

	Frequency (%)		
Variable	HRG, *n* = 40	RRG, *n* = 38	*p*-value
Arm	26 (65)	20 (53)	0.2701
Leg	33 (83)	30 (74)	0.6926
Rapid movements	23 (58)	14 (37)	0.0696
Mobility	26 (65)	19 (50)	0.1830
Balance	12 (30)	8 (21)	0.3688
Total score	9 (22.5)	2 (8)	0.0298

HRG = home rehabilitation group; RRG = routine rehabilitation group.

Table IV. *Perceived dysfunction as per Sickness Impact Profile (SIP) in the home rehabilitation group (HRG) and routine rehabilitation group (RRG) at 6 months, median score and interquartile range (IQR)*

Category	HRG, $n = 40$ Median (IQR)	RRG, $n = 38$ Median (IQR)	p-value
Overall SIP	16.0 (8.1–24)	11.6 (6.9–26.1)	0.8887
Physical dimension	15.9 (3.8–22.7)	14.5 (8.7–25.4)	0.3321
Ambulation	23.5 (9.3–30.8)	24.2 (17.1–30.9)	0.2379
Mobility	2.9 (0–29.1)	15.3 (0–39.1)	0.2064
Body care and movement	10.9 (0–23.8)	11.5 (4.7–22.5)	0.5469
Psychosocial dimension	14.7 (4.3–26.6)	9.7 (4–22)	0.2339
Social interaction	10.5 (5.8–22)	13.2 (0–21.9)	0.6689
Alertness behaviour	14.4 (0–30.3)	9.9 (0–27.5)	0.7099
Emotional behaviour	11.9 (0–33.2)	7.7 (0–20.1)	0.1747
Communication	18.5 (0–30.8)	0 (0–18.9)	0.0158
Independent categories			
Sleep and rest	16.8 (0–35)	12.2 (0–23.6)	0.3833
Eating	5.2 (0–10.7)	5.2 (0–10.9)	0.6860
Work	0.0 (0–0)	0 (0–0)	0.9854
Household management	24.4 (0–36.1)	21.6 (10.3–57.2)	0.4351
Recreation and pastime	28.2 (10.3–42.2)	22.3 (10.2–42)	0.9760

coping capacity revealed a remarkable and statistically significant effect of home rehabilitation on the Barthel ADL Index level of independence.

At 6 months, patients with negative outcomes, death or dependency on the Barthel ADL Index amounted to 10 (24%) in the HRG, and 18 (44%) in the RRG.

Changes in patient outcome of statistical significance at 3 to 6 months in the HRG and/or the RRG are outlined in Table VI.

DISCUSSION

As against the 3-month follow-up (14), differences in patient outcome in favour of the HRG had increased at 6 months, though not sufficiently to attain the designated level of statistical significance. In line with other studies, such as the pilot study (22), that by Skilbeck et al. (34) and the Copenhagen study (35), the major post-stroke improvements in motor capacity and ADL function were seen during the first three months after stroke onset. The improvements seen during the second quarter after stroke, a period when approximately 20% of the intervention under evaluation took concrete form, were unexpected. Despite its limited size, this study strongly suggests a noticeable differential improvement at 3 to 6 months post-stroke for patients receiving early supported discharge and continued rehabilitation at home compared with patients receiving routine rehabilitation, chiefly in motor capacity, manual dexterity, walking, extended ADL and perceived dysfunction.

Taking into account the (i) limitations of the study, which were indicated in prior publications (14, 15), viz., study size and the likely insufficient effectiveness of randomization, resulting

Table V. *Effects of rehabilitation at home 3 and 6 months after stroke, assessed by multivariate analysis*

	Odds ratio (95% C I) at 3 months			Odds ratio (95% C I) at 6 months		
Variable	Crude	Adjusted	Adjusted SOC included*	Crude	Adjusted	Adjusted SOC included†
High motor capacity	1.57 (0.59–4.18)	1.09 (0.41–2.84)	0.42 (0.14–1.29)	1.53 (0.62–3.77)	2.70 (0.56–13.09)	2.24 (0.45–11.09)
Good manual dexterity	1.46 (0.40–5.47)	1.13 (0.56–2.28)	0.96 (0.42–2.17)	2.13 (0.85–5.30)	3.10 (0.76–12.60)	3.72 (0.80–17.26)
Good walking ability	2.24 (0.44–12.54)	1.13 (0.56–2.26)	1.05 (0.47–2.35)	2.57 (1.03–6.41)	3.6 (0.98–10.84)	3.00 (0.87–10.38)
Independence in ADL, Barthel	1.29 (0.46–3.61)	1.18 (0.56–2.48)	1.08 (0.45–2.55)	2.25 (0.84–6.03)	3.78 (0.92–15.54)	5.78 (1.18–28.35)
Independence in extended ADL	1.49 (0.53–4.21)	1.55 (0.60–4.01)	0.76 (0.26–2.21)	1.86 (0.76–4.57)	2.28 (0.64–8.03)	2.50 (0.68–9.21)
High frequency of social activities	1.06 (0.40–2.80)	2.36 (0.86–6.51)	0.46 (0.14–1.45)	1.24 (0.51–3.04)	2.85 (0.74–10.93)	3.29 (0.79–13.64)
Low perceived dysfunction-SIP total	0.52 (0.19–1.40)	0.84 (0.38–1.90)	1.66 (0.65–4.16)	0.66 (0.27–1.61)	0.94 (0.30–2.93)	1.26 (0.35–4.54)
Low SIP Communication	0.45 (0.16–1.26)	0.55 (0.25–1.72)	2.31 (0.68–7.82)	0.39 (0.16–0.98)	0.63 (0.20–1.96)	0.69 (0.22–2.21)

* Analysis based on 75 patients, followed-up 6 and 12 months after stroke.
† Analysis based on 76 patients, 73 patients at 12 months and 3 patients 6 months after stroke.
SOC = Sense of Coherence; SIP = Sickness Impact Profile.

Table VI. *Changes of statistical significance in outcome in the home rehabilitation group (HRG) and/or routine rehabilitation group (RRG) at 3 to 6 months; median score and interquartile range (IQR)*

Variable (range)	HRG, *n* = 40 3 months Median (IQR)	6 months Median (IQR)	*p*-value*	RRG, *n* = 38 3 months Median (IQR)	6 months Median (IQR)	*p*-value*
LMCA, total motor (0–153)	139.5 (139.5–149.5)	148.5 (145.5–151.5)	<0.001	144.5 (136–148)	147 (140–151)	<0.001
Arm (0–57)	56 (52–57)	57 (56–57)	<0.001	55 (51–57)	57 (53–57)	0.0032
Leg (0–36)	36 (35–36)	36 (36–36)	0.0284	36 (35–36)	36 (36–36)	0.0178
Mobility (0–27)	27 (26–27)	27 (26–27)	0.0086	26 (26–27)	26.5 (26–27)	0.6744
Rapid movements (0–12)	11 (9–12)	12 (10–12)	<0.001	10 (8–11)	10.5 (9–12)	0.0041
Balance (0–21)	18 (16–20)	18.5 (17–21)	0.0021	17 (16–19)	18 (17–20)	0.0024
Walking 10 m, s	11.5 (8–15)	10 (8.5–13)	0.0051	12.5 (10–16)	11 (10–17)	0.5235
Manual dexterity *n* of pegs/s†	0.32 (0.2–0.39)	0.36 (0.26–0.43)	0.0055	0.3 (0.2–0.4)	0.32 (0.17–0.39)	0.9922
Katz extended ADL (4–8)	7 (6–8)	8 (6–8)	0.0229	7 (5–8)	7 (5–8)	0.1060
FAI total (0–45)	20 (15.5–26.5)	24 (20–28.5)	<0.001	17.5 (11–25)	21.5 (16–27)	<0.001
Social outings (0–3)	1 (0–3)	2 (1–3)	0.0019	2 (1–3)	2 (1–3)	0.1626
Light household work (0–3)	3 (2–3)	3 (2–3)	0.0935	1.5 (0–3)	3 (0–3)	0.0300
Local shopping (0–3)	3 (0.5–3)	3 (1.5–3)	0.1763	3 (0–3)	3 (1–3)	0.0113
Driving/Public transportation (0–3)	1 (0–3)	3 (0–3)	0.0042	0.5 (0–3)	2 (0–3)	0.0016
SIP Mobility (0–100)	22.4 (0–39.7)	2.9 (0–29.1)	0.0145	16.3 (4.1–31.6)	15.3 (0–39.1)	0.9922
Household management (0–100)	28.4 (8.7–54.4)	24.4 (0–36.1)	0.0446	32.8 (14.7–46.6)	21.6 (10.3–57.2)	0.3911

Wilcoxon signed-ranks test.
† All patients included, unable = 0 pegs/s.
LMCA = Lindmark Motor Capacity Assessment; FAI = Frenchay Activities Index; SIP = Sickness Impact Profile.

in imbalances favouring the HRG in pre-stroke levels of social activities and the RRG in size of lesion, associated diseases, coping capacity and the number of patients with aphasia and severity of same; (ii) good compliance with the home rehabilitation programme, indicating that the design of the programme can be deemed acceptable; (iii) low number of losses in follow-up at 3 to 6 months; (iv) excellent collaboration in interviews and testing procedures, and; (v) absence of specific problems during the first 6 months, the results appear to be relevant. Moreover, the results are in concordance with the 6-month follow-up of the DOMINO study (10), in which greater improvements in extended ADL were made between 3 and 6 months by stroke-unit, stratum patients allocated to domiciliary rehabilitation services than by those allocated to hospital-based rehabilitation.

Lack of evidence of significant improvements between 3 and 6 months in stroke outcome studies, though conceivably attributable to rehabilitation received, might also be due to shortcomings in methodology, thus precluding the detection of such changes in patients with moderate disability after stroke. A combination of instruments is thus required if such improvements are to be ascertained. The Katz ADL (19) and Barthel ADL Indices (26) were appropriate in monitoring changes in the early stages after stroke, but by 3-months' follow-up median scores were already equivalent to maximal scores. However, the Extended Katz ADL Index (28) and the Frenchay Activities Index (29) reflected significant changes between 3 and 6 months, thus proving suitable as complementary instruments. While the Lindmark Motor Capacity Assessment (16) revealed undeniable changes at 3 to 6 months in the HRG and RRG, the aggregation of outcomes around the maximal score is indicative of a ceiling effect and justifies the use of additional instruments (24, 25) in order to monitor further improvement in motor capacity. The combination of a significantly higher frequency of Lindmark Motor Capacity Assessment maximal Total Motor scores at 6 months, with differences approaching the level of statistical significance in manual dexterity as per the Nine-Hole Peg Test and gait velocity as per walking 10 m/s, is suggestive of a better outcome in motor capacity for the HRG.

Statistically significant changes on an impairment level are particularly relevant in rehabilitation, provided corresponding changes are present on a disability (3) and, above all, on a handicap level (3). Substantial differences or changes over time in perceived dysfunction have not been reported in randomized post-stroke home rehabilitation trials (8–13). The higher SIP-based (4) perceived dysfunction revealed, at both the 3- and 6-months' follow-up in our study, for the HRG in all aggregated scores as well as in several separate items may reflect a slightly more stressful situation for patients receiving rehabilitation at home. The pre-stroke SIP is unknown but it seems plausible to assume a higher level of dysfunction in the HRG, based on a significantly higher frequency of associated diseases prior to stroke, and a significantly lower level of Sense of Coherence coping capacity, known to be negatively correlated to the SIP (36). Despite the paucity of data, the considerably high odds ratio observed in logistic regression analysis when Sense of Coherence is adjusted for, underlines the influence of coping capacity on rehabilitation outcome.

The changes in the SIP score over time disclose variations occurring during the study, which may possibly reflect the type

of rehabilitation received. The HRG patients experienced a change for the better between 3 and 6 months, expressed as a significant reduction in perceived dysfunction of SIP Ambulation and Household management, matching the significant improvements in motor capacity and extended ADL. The statistically significant difference at 3 months (14) between the HRG and RRG in SIP Emotional behaviour had been reduced to a non-significant level at 6 months by a decrease in perceived dysfunction among the HRG patients and an increase in perceived dysfunction among the RRG patients. This is an important finding, which calls for careful follow-up, as it could be a sign of differences in coping capacity and of increased stress in the early stages of home rehabilitation, or a temporal difference between the groups in the adaptation processes after stroke.

There was no increase in mortality with home rehabilitation, HRG $n = 1$ (2%), RRG $n = 3$ (8%). The Newcastle study (13) reports comparable rates for mortality, 2% and 10%, respectively, at three months' follow-up. Similarly, HRG patient safety in the form of falls was in no way jeopardized by early discharge to the home environment. There was no statistical difference between the HRG and the RRG in the frequency of falls or injurious falls during the first 6 months after stroke onset.

From the above, it must be concluded that, for moderately disabled stroke patients with mental function within normal limits, early discharge from the stroke unit with continuation of post-stroke rehabilitation at home is not less beneficial than conventional rehabilitation 6 months after stroke onset, without limitation as to age or living conditions. Significant improvements at 3 to 6 months after stroke, at impairment, disability and handicap levels as well as in subjective health-related quality of life, were achieved only in the case of the home rehabilitation programme. Long-term effects following discontinuation of the home rehabilitation programme have yet to be analysed.

ACKNOWLEDGEMENTS

We extend our thanks to the rehabilitation team: A. Fyrby, M. Holm, Department of Physical Therapy; M. Linde, G. Widzell, Department of Occupational Therapy; I. Öhlund, Department of Geriatric Medicine and H. Tegler, Department of Neurology for training the patients at home; P. Diener, B. Höjeberg, Department of Neurology, Huddinge University Hospital for assistance in the recruitment of patients; K. Jansson-Halme and K. Johansson for data collection at 6 months; and G. Landérus-Svensson, H. Ytterberg, and L. Cifuentes for retrieving information from the computerized register at Stockholm County Council. This study was supported by the Swedish Medical Research Council (K91-27Ä-09764-02), and by grants from The Swedish Association of Neurologically Disabled (NHR), The Swedish Stroke Association, Foundation Solstickan, funds from Karolinska Institutet and the Carlos III Institute of Health in Madrid.

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